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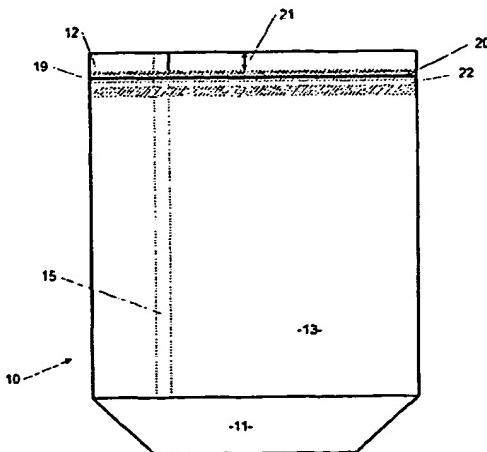
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(54) Title: BAG



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(57) Abstract: A lie flat bag (10) assembly of a kind having a plastics pouch (29) within a block bottom factory finished end (11) (the "bottom end") protective bag, the pouch (29) and the protective bag (13) having their mouths opening in the same direction, the bag (10) being characterised in that (i) the protective bag (13) has at the customer fill end (the "top end") a closure flap (12) from one of its panels capable of being folded across the mouth of the protective bag (13) to lap part of another panel thereby, when adhered thereto, to effect at least a substantial closure of the mouth of the protective bag (13), (ii) at least one of the lapping surfaces (23A) (ie; of at least part of the closure flap (12) and part of said another panel (24)) is of and/or is coated with a heat activatable adhesive (21) (iii) a tear strip (25) is provided on a surface of or in the closure flap (12) and/or its panel (24) to allow, by its use as a tear strip (25), the tear opening of the closure flap (12) enclosed mouth of the protective bag (13) by enabling a separation of part or all of the closure flap (12) from its other part or the panel (28) from which it was folded.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

“BAG”**FIELD**

This invention relates to packaging and in particular bags used for the packing of powders or granules. Such bags typically have an inner plastic pouch, which can be heat sealed once filled with product, and is surrounded and supported, by an outer bag. Typically the outer bag is formed from multiple layers of paper. Such bags are used to pack and transport resins, plastics, granules and in particular food grade materials such as milk powders, casein, powdered choose, protein products, and a variety of food ingredients.

BACKGROUND

Such bags require the outer bag to be removed prior to dispensing the contents from the inner sealed pouch.

There have been many attempts to provide an economical means for opening and/or removing the outer bag. Typically in the case of an outer bag formed of two, three or four ply of Kraft paper, the opening mechanism involves a tear off panel of paper on the base of the bag. See the options in this respect discussed and/or cross referenced in New Zealand Patent 242034.

However, such bags need to be robust enough to withstand a drop test. If the base of the bag is too easy to open, the bag is likely to fail the drop test. Conversely if the base of the bag is securely fastened it may be difficult to open at its destination.

Whilst attempts have been made to render easier top end opening (eg; NZ Patent 182376 with a pinch bottom bag and a pull through string at a top closed factory end) these have tended to provide difficulties of manufacture and filling and closure.

OBJECT

It is an object of this invention to provide an improved bag of the type wherein an outer protective bag can be readily removed from the inner sealed pouch, or one, which will at least provide the public with a useful choice.

STATEMENTS OF INVENTION

In another aspect the present invention consists in a lie flat bag assembly of a kind having a plastics pouch within a block bottom factory finished end (the "bottom end") protective bag, the pouch and the protective bag having their mouths opening in the same direction at the top the bag *being characterised in that*

- (i) the protective bag has at the customer fill end (the "top end") a closure flap from one of its panels capable of being folded across the mouth of the protective bag to lap part of another panel thereby, when adhered thereto, to effect at least a substantial closure of the mouth of the protective bag,
- (ii) at least one of thelapping surfaces (ie; of at least part of the closure flap and part of said another panel) is of and/or is coated with a heat activatable adhesive,
- (iii) a tear strip is provided on a surface of or in the closure flap and/or its panel to allow, by its use as a tear strip, the tear opening of the closure flap enclosed mouth of the protective bag by enabling a separation of part or all of the closure flap from its other part or the panel from which it was folded.

Preferably the tear strip is on a surface of the closure flap that is concealed when the protection bag is closed.

Preferably the tear strip is of a plastics material.

Preferably the protective bag is of one or more plies of paper.

Preferably said plastics pouch is of a thermoplastic material capable of being heat sealed at or adjacent its mouth whilst within the protective bag.

In some forms the tear strip may have been provided by an extrusion process directly on to a surface of the protective bag in which case, preferably, the thermoplastic material of the tear strip has a higher tack initiation temperature than does the adhesive to be heat activated to enable the effecting of the closure.

In still other forms the tear strip may have been provided by a self adhesive tape applied to a surface of the protective bag.

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Preferably the tear strip has a tack temperature at least 20°C greater than that of the heat activated adhesive.

In another aspect the invention provides a factory produced block bottom lie flat bag having

an inner plastics pouch capable of being heat sealed after insertion of a product such as a powder or granule, and

an outer protective covering,

wherein the outer protective covering having the block bottom has

a closeable top portion extending transversely across the top of the bag, and

a tearing means has been factory provided on the outer protective layer prior to closure of the outer protective covering.

Preferably the bag has a folded flap closure, and will preferably make use of adhesive to secure the flap across the top of the bag.

In its most preferred from the tearing means is a tear strip (ie; is not a string) formed on or adjacent to the top flap.

More preferably the adhesive used for sealing the top flap of the bag is a heat re-sealable hot melt adhesive. This is preferably applied to both the flap, and the adjoining portion of the bag to be covered by the flap.

It is particularly preferred that the tear strip is formed by application to the protective covering material a tensile material, which can be applied as a continuous strip or stripe to the top of the bag. This tensile material can be applied as (i) a molten plastics material which adheres to a portion of the bag during manufacturing, but which sets to a solid strip having sufficient tensile strength to enable it to be pulled to cause the top of the bag to be opened, (ii) as a preformed (preferably self adhesive) tape.

Optionally the top of the bag has either perforations or notches, in association with the tensile material, so that a portion of top of the bag (or the flap or both) is weakened to facilitate tearing of the top of the bag by the use of pulling on the tensile material.

Optionally the tensile material is applied a form of hot melt adhesive which is applied to the inside of the flap of the bag and allowed to cure *in situ*, before other layers of hot melt adhesive are applied to the flap and the exterior of the bag. Such a material is preferably applied after perforating or notching of the bag, so that the tensile material covers, and plugs up any perforations in that portion of the bag. By applying the tensile material as a relatively thick bead or stripe, sufficient material will be applied to enable it to act as a tensile material.

In a further aspect the present invention consists in a filled and fully closed bag assembly in accordance with the present invention, the filling being with a particulate material, the plastics pouch having been heat sealed by application of heat through the protective bag and the protective bag having been closed with the lapping surfaces mating after heat activation of the heat activatable adhesive.

These and other aspects of this invention which should be considered in all its novel aspects, will become apparent from the following description, which is given by way of examples only, with reference to the accompanying drawings, in which;

Figure 1 is a front elevation of a bag prior to closure of the top,

Figure 2 is a similar view to that of Figure 1 but concentrating on the top or customer end of an unfilled bag assembly in accordance with the present invention,

Figure 3 is a diagrammatic section of the bag of Figure 2 at "AA",

Figure 4 shows a flow diagram of a filling method for bag assemblies of the prior art kind discussed hereinafter, the bag assemblies of the present invention involving a similar filling methodology but without requiring scoring wheels to score the inner pouch and hence not requiring a station for such a purpose,

Figure 5 is a flow diagram schematic of the tubing and bottoming process, and

Figure 6 shows details of the bottoming station.

An embodiment will be described where there is a plastics pouch tack adhered to the inside of a paper protective bag.

A breakaway adhesive is preferably used to attache the pouch onto the outer layer/s of the bag for manufacturing and filling purposes. On removing the filled pouch from the

outer coverings, the adhesive is designed to "release the pouch", with minimal fibre tear from the outer layer. Adhesives used in this application could be a Henkel Grippit Z 9834™ or Mercator Technology's EM 186™.

In Figure 1, a bag 10 is formed to include a plastic pouch (eg; polyethylene), a base portion 11, and a top flap 12. Preferably the flap is designed to be folded over the edge 19 after filling and sealing of the pouch, so that the outer covering 13 completely covers and surrounds the inner pouch.

The bag may have a longitudinal seam 15.

In this example the bag is preferably formed with an outer covering made up of two ply of paper, preferably Kraft paper. By using two layers of Kraft paper, the inner and outer layers of paper can be offset from one another to allow for the formation of the flap 12.

As discussed in the variations section below, it is possible to have the outer covering of the bag formed from a single layer of material, in which case the flap may need to be specially formed.

During the manufacture of the bag, the pouch is surrounded by the paper outer, and this is then sealed by appropriate adhesive layers along seam 15. The base of the bag 11 is formed, and the inner pouch is tacked to one side of the paper outer bag by hot melt adhesives or the like, so that the plastic pouch is held *in situ* during both the formation of the bag, and during filling. In this example the base of the bag may be a block base, although any type of base can be formed depending on the end use of the bag. In the packaging of milk powder, a block base bottom is preferred.

The manufacturing procedure, base, formation of the inner plastics pouch and the formation of the outer protective pouch can be any appropriate variant including for example, those disclosed in our New Zealand Patent No. 242034 the full content of which is here included by way of reference.

The top flap is designed to be adhered to the top of the bag by means of a suitable adhesive. It is preferred that the adhesive is a heat re-sealable hot melt so that once the bag is supplied to an end user, and the plastic pouch is filled with a product, the plastic pouch is then being heat sealed, by the application of heat sealing bars

applying heat and pressure through the outer paper layer(s) and into contact with the plastic pouch. Once the pouch has been sealed the top flap is folded over, and adhered by the adhesive layer. If the adhesive layer is a resealable hot melt, then the application of heat and pressure in the packing plant will enable the top flap to be suitable folded and sealed.

During manufacture of the bag it is preferably that a tear strip is provided at the top of the bag as shown in Figure 1. This tear strip can be formed during manufacture of the bag by the application of a meltable plastics layer, applied as a bead, stripe or the like across the top of the bag at about the position of the fold line of the top flap. By applying a material, which can be melted, and applied as a thick bead or stripe, and allowed to solidify *in situ* it is possible to extrude this, during manufacture of the bag leaving a small portion protruding from one or both sides of the bag. By forming this from material such as EVA/PVA, with sufficient tensile strength to allow it to withstand at least a 10kg pull, it is possible to form this as a tensile material (effectively a pull string or pull rope of plastics material extending across the top of the bag).

Once the tensile material is formed *in situ*, a layer of hot melt (heat re-sealable) adhesive can be applied over the top of this tensile strip, and then allowed to cool to a "non-tacky" state. At the same time a similar layer of re-sealable hot melt adhesive can be applied to the outside of the top of the bag adjacent to the top flap.

The tensile material is applied first as strip 20, it is then covered by a layer of hot melt adhesive covering the inside of the top of the flap as layer 21, and the outside of the top of the bag (the inner ply of a two ply bag) is provided with layer 22 of re-sealable hot melt material.

The tensile material is preferably a hot melt adhesive, or similar meltable material (eg; if applied as a tape or extruded) but which is not capable of being remelted during sealing of the flap. This means that it would preferably have a much higher melting point than the heat re-sealable hot melt applied to the top flap.

The hot melt adhesive used at the customer end is a low temperature LDPE or EVA (Ethyl Vinyl Acetate) based adhesive, typically known as 'hot melt' adhesives.

The hot melt adhesive is applied to the outer layer material using a common application method, for example using a Nordson Hot melt applicator. The hot melt is generally applied to the bag at temperatures in the range of 140 to 180 degrees C. The hot melt adhesive has a reactivating temperature typically in the range of 110 to 130 degrees C.

The tear tape is mono axially oriented polymer tape coated with a pressure sensitive adhesive on one side. Typical tear tape physical properties are stable up until 180 degrees C. Certain types of tear tape are stable up to 250 degrees C and beyond. A differential of at least 20 degrees C should desirably be maintained between the reactivating temperature of the hot melt adhesive and the temperature at which the tear tape's physical properties are affected by the temperature.

The tear feature may be extruded onto the outer material using an extrusion method where the polymeric material is heated under pressure to around its melting point and extruded through a die to form a shape similar to the tear tape. Hot melt can then be applied into the nip point between the tape and the outer layer, bonding the polymeric material to the outer layer.

The tear strip if provided as an applied tape is mono axially oriented polymer coated with a pressure sensitive adhesive that when attached to the outer layer material under pressure bonds to the outer layer material. An example of the tear tape is RIPPATAPE™ supplied by PP Payne, UK capable of being applied with a Standard Budget Applicator supplied by PP Payne, UK.

In some cases the outer layer of the bag may be of a material which is designed to tear readily, and it may not be necessary to provide perforations, nicks, or slits in the top of the bag during manufacture. However, it is preferred that the outer material of the bag is sufficiently strong that its tear resistance is great enough to resist damage to the outside layer of the bag during manufacture, packaging and transport. Hence it is preferable that one or more weaknesses are provided in the top of the bag, and this may take the form of a nick at either or both ends of the bag, or needle perforations, or partial perforations or slits in an outermost layer of the bag (if two ply paper material is used then it may be possible to perforate one layer but not the inner most layer).

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In one preferred form it is preferably that at least nicks or notches be provided on either side of the bag, and that these nicks or notches be covered completely by the plastics material which is allowed to solidify, so that there is no aperture for the ingress of dirt, insects or other material. It will be noted that the tear strip, and any associated perforations will be situated above the heat sealed portion of the plastics pouch. Nevertheless it is preferable that the extruded plastics material used to form the tensile strip is of sufficient size to completely cover any weakened portions of the bag. This has the advantage that on pulling the tensile strip, it is possible to cause the bag to tear neatly along the line of weakness.

The weakening or perforating desired yet optional can be effected anywhere between the last tubing process and the collating point prior to the compression station in the bag making process. A number of different mechanisms may be employed to get the desired effect. For example the outer ply or plies of material may be perforated using a laser method, like a variant of the Linx Xymark™ laser coding system, or a more typical pin-and-wheel device for mechanically perforating and weakening the outer layers.

The invention has been described with reference to a two ply bag embodiment in which the outer bag is formed of two ply of Kraft paper or the like. It is applicable to any outer covering for example a three ply or four-ply paper covering, a plastics covering, or a single layer outer bag (and is preferably a single layer composite material as described in our co-pending patent application).

Although it is preferred that the tear strip is formed transversely across the top of the bag it could be formed at any location in the outer covering, e.g; it could be formed as part of the longitudinal seam, or it could (less preferably) be formed in or adjacent the base of the bag.

By using a layer of meltable material, which can be extruded and applied as a stripe along the top of the bag, it is possible to form the tear strip, during manufacture of the bag without the need for applying a tape, or other roll material.

In addition, by providing the opening of the outer bag at or adjacent to the top of the outer bag, the base of the bag can be formed more securely, and be designed to resist impacts, such as the industry standard "vertical drop test".

In the embodiment depicted in Figures 2 and 3 the assembly comprises a protective bag (gusseted or non gusseted, preferably not gusseted) which includes a front panel defined by Kraft paper sheets 23 and 24. It follows therefore that the same plies provides the rear panel 23A and 24A. The tear strip 25 is preferably of tape as aforesaid and hot melt regions 26 and 27 respectively are provided on the paper plies 24 and 23A respectively over the top flap region 28 of the ply 23A such that it will lap over fold and mate with its heat activatable hot melt adhesive.

Preferably the greater depth of the region 27 (as far as in the plane of the bag assembly is concerned) means that some of the heat activatable hot melt 27 is available to lap over not only the exposed heat activatable adhesive 26 of the ply 24 but also a top part of the panel or ply 23. It can be seen that the tear strip therefor has the capability of being uplifted at an edge to effect a tear across the ply 23A thus allowing access to the by then sealed plastic pouch with its plies 29.

The bag is formed with an internal plastic pouch (inner) and an outer protective covering (outer) made up of multiple plies of Kraft paper. The outer ply material have basis weight in the range from 90 - 150 gm per m². The Kraft paper plies provide a soft,

shock-absorbing covering. The internal plastic pouch can be produced with permeable film, or gas and moisture barrier film. The permeable film tube is made from low density polyethylene preferably by means of monolayer blown film extrusion. The barrier film tube is made from combinations of low density polyethylene, linear low density polyethylene, medium density polyethylene, and resins with gas barrier properties, such as ethylene vinyl alcohol, polyamide (Nylon), etc. The process for the barrier film production is multilayer blown film extrusion preferably.

The forming of a bag as shown in Figures 2 and 3 is by a procedure shown by way of diagram 4 in which 33 is a de-aireator, 34 is a vibrating conveyor/weighing/fine filling station, 35 is a neck strength stretch station, 36 is a heat sealing zone to seal the

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inner pouch, 37 involves scoring wheels to score the inner pouch, 38 is the hot melt adhesive system reactivation, 39 involves folding ski's, 35 involves pressure rollers and 36 involves a weight station, metal detection station and warehousing.

The procedure 33 through 36 are those used with bags not incorporating the feature of the present invention. Bag assemblies of the present invention do not require step 37.

Figure 5 provides a schematic of tubing station with 37 depicting a roll shaping station, 38 depicts perforating knives, 39 depicts a glue station for cross pasting, 40 is a seam glue station, 41 is a forming station, 42 is a seam hot melt station, 43 is a breaker station, 44 is a pouch heat sealer and 45 is a take off area.

In Figure 6 the bottoming station is shown as a flow diagram by reference to a feeder 46, an alignment table phase 47, an opening station 48, a hot melt application 49, a tape applicator station 50 (which if desired can be swapped in sequence with 51), 51 is a bottom seeking pasting station, 52 is a bottom patch unit, 53 is a pressing/slat conveyor and 54 is a take off area.

Reference herein to "stations" is not to be taken as meaning that the process to be performed at any such a stage must necessarily involve a stationery web or stationery apparatus. Reference to "station" therefore should be interpreted as meaning a stage of the sequence in the scheme of things irrespective of whether or not it is continuous or continual in its operation.

In use the method of opening and emptying the bag of most prior art bags and those of the present invention at, for example, powder processing plants is as the current situation (prior art bags with an "easy open" feature at the bottom or "factory" end rather than at the top or "customer" end):

- (i) Lay the bag down with the front of the bag facing down.
- (ii) Tear bottom patch using the tear tape provided.
- (iii) Place fingers into opening in the centre of the bottom of the bag.
- (iv) Using the opening as a starting point tear open the rest of the block bottom.

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(v) When the bottom is fully opened, grab the bottom of the inner pouch and remove by pulling.

(vi) Then discard paper outer.

This opening mechanism is not easy to use.

The tear top feature of the present invention allows for easy opening from the top or "customer" end (ie; the filling end) of the bag.

1. Place the bag in an upright position
2. Tear the top of the bag using the tear tape provided.
3. Tip the bag upside down.
4. Hold the bottom of the bag and lift, this will allow the inner pouch to slide out. This can be down directly onto a conveyor.
5. Discard paper outer.

Note: the design of the block bottom preferably used is to make it easy to hold on to and therefore allows for easier tipping out of the plastic pouch.

It is believed that this invention will facilitate the manufacture of bags, and provide advantages both in the manufacture of the bags, and in the filling and transport of such bags.

Finally, various other alterations or modifications may be made to the foregoing without depriving from the spirit or scope of this invention.

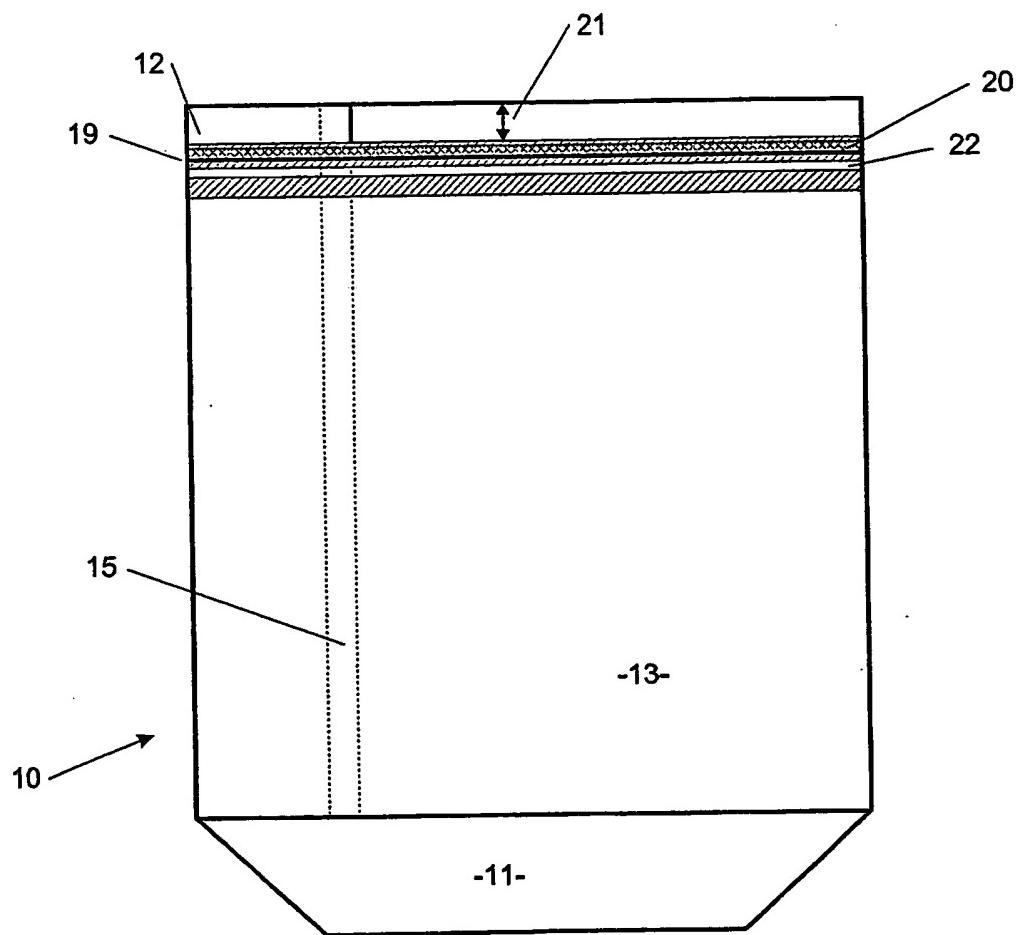
CLAIMS:

1. A lie flat bag assembly of a kind having a plastics pouch within a block bottom factory finished end (the "bottom end") protective bag, the pouch and the protective bag having their mouths opening in the same direction, the bag *being characterised in that*
 - (i) the protective bag has at the customer fill end (the "top end") a closure flap from one of its panels capable of being folded across the mouth of the protective bag to lap part of another panel thereby, when adhered thereto, to effect at least a substantial closure of the mouth of the protective bag,
 - (ii) at least one of thelapping surfaces (ie; of at least part of the closure flap and part of said another panel) is of and/or is coated with a heat activatable adhesive,
 - (iii) a tear strip is provided on a surface of or in the closure flap and/or its panel to allow, by its use as a tear strip, the tear opening of the closure flap enclosed mouth of the protective bag by enabling a separation of part or all of the closure flap from its other part or the panel from which it was folded.
2. An assembly of claim 1 wherein the tear strip is on a surface of the closure flap that is concealed when the protection bag is closed.
3. An assembly of claim 1 or 2 wherein the tear strip is of a plastics material.
4. An assembly of any one of claims 1 to 3 wherein the protective bag is of one or more plies of paper.
5. An assembly of any one of the preceding claims wherein said plastics pouch is of a thermoplastic material capable of being heat sealed at or adjacent its mouth whilst within the protective bag.
6. An assembly of any one of claims 1 to 5 wherein the tear strip has been provided by an extrusion process directly on to a surface of the protective bag and the thermoplastic material of the tear strip has a higher tack initiation temperature than does the adhesive to be heat activated to enable the effecting of the closure.

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7. An assembly of any one of claims 1 to 5 wherein the tear strip has been provided by a self adhesive tape applied to a surface of the protective bag.
8. An assembly of any one of the preceding claims wherein the tear strip has a tack temperature at least 20 °C greater than that of the heat activated adhesive.
9. **A factory produced block bottom lie flat bag having**
 - an inner plastics pouch capable of being heat sealed after insertion of a product such as a powder or granule, and
 - an outer protective covering having the block bottom,
 - wherein the outer protective covering has
 - a closeable top portion extending transversely across the top of the bag, and
 - a tearing means has been factory provided on the outer protective layer prior to closure of the outer protective covering.
10. **A filled and fully closed bag assembly** in accordance with any one of claims 1 to 8 the filling being with a particulate material, the plastics pouch having been heat sealed by application of heat through the protective bag and the protective bag having been closed with the lapping surfaces mating after heat activation of the heat activatable adhesive.

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**FIGURE 1**

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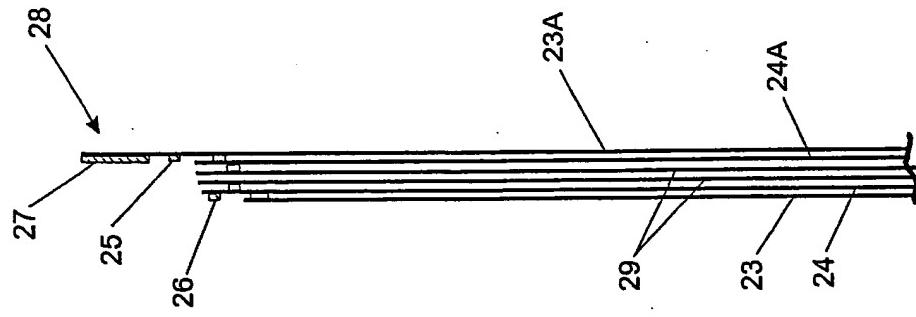


FIGURE 3

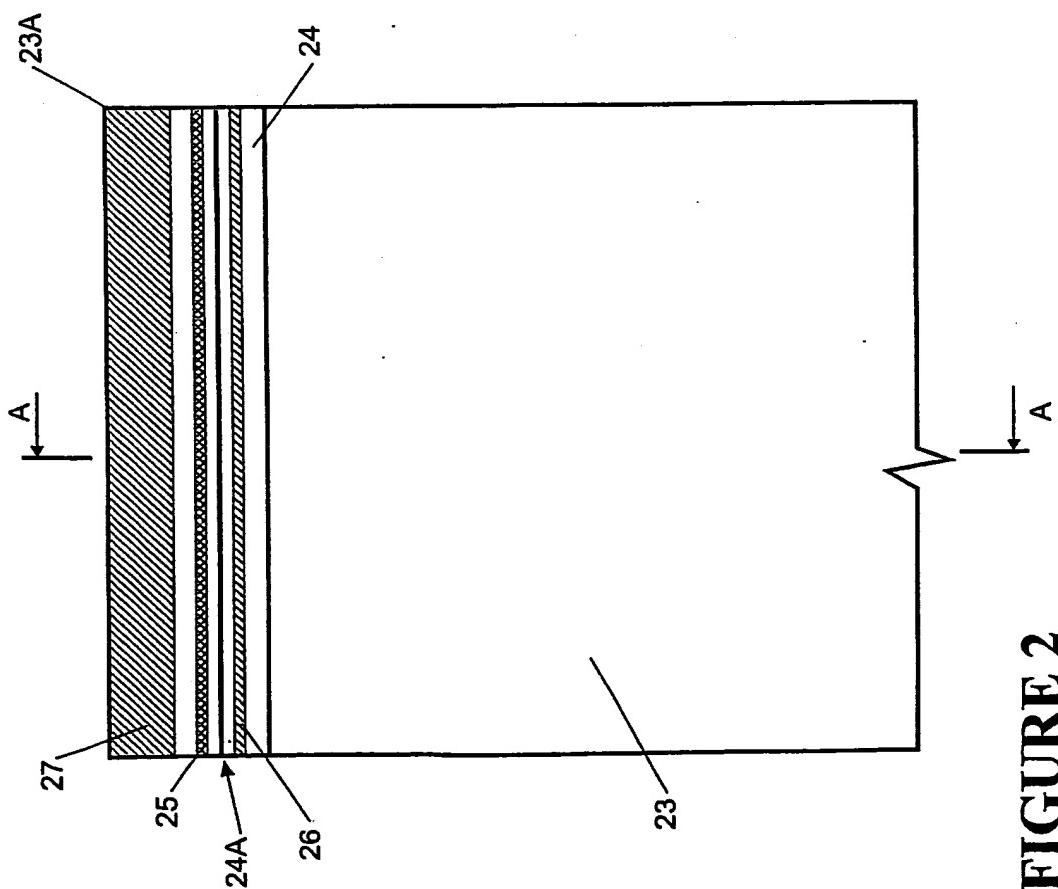
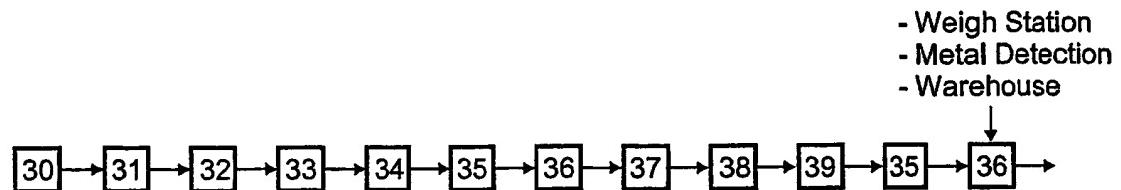
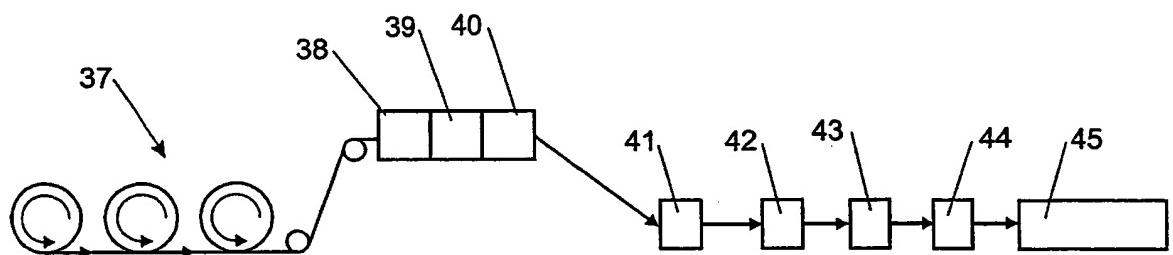
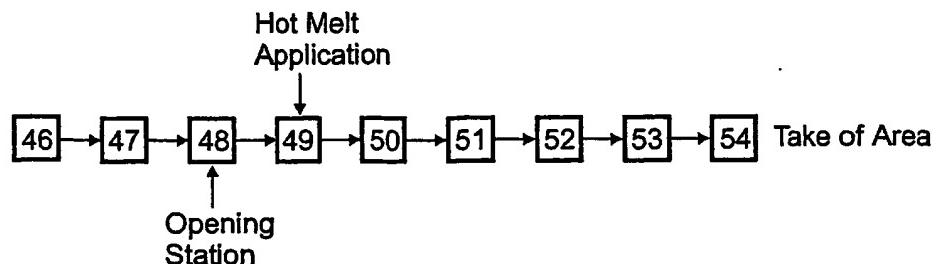


FIGURE 2

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**FIGURE 4****FIGURE 5****FIGURE 6**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ02/00206

A. CLASSIFICATION OF SUBJECT MATTERInt Cl. ⁷: B65D 77/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 DWPI:IPC B65D 30/-, 33/-, 77/04, 77/06, 85/- & keywords: block bottom, tear, slit, weakness, inner, outer, inside, liner, pouch, protect, cover, case, paper, tack, glue, gum, adhere, bond, polymer, plastic and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	BE 858369 A (ST REGIS PAPER COMPANY) 2 January 1978 Whole document	1-10
X	EP 0103650 A (WALTER DURBECK PAPIERSACKFABRIKEN GMBH & CO KG) 28 March 1984 Whole document	1-10
X	CA 2304261 A (INTERNATIONAL PAPER COMPANY) 12 February 2001 Whole document	1-10

 Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
11 December 2002Date of mailing of the international search report
23 DEC 2002Name and mailing address of the ISA/AU
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Facsimile No. (02) 6285 3929Authorized officer
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Telephone No : (02) 6283 2607

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ02/00206

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NZ02/00206

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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